

# REPORT DOCUMENTATION PAGE

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MEMORANDUM FOR PRS (In-House/Contractor Publication)

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FILE

F04611-01-C-0010

12 Nov 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-AB-2002-282**  
J.A. Muss (Sierra) et al., "The Performance of Hydrocarbon Fuels with H<sub>2</sub>O<sub>2</sub> in a Uni-element  
Combustor" (abstract only)

Rich  
56171

AIAA Joint Propulsion Meeting  
(Huntsville, AL, 20-23 July 2003) (Deadline: 6 Dec 02)

(Statement A)

# The Performance of Hydrocarbon Fuels with H<sub>2</sub>O<sub>2</sub> in a Uni-element Combustor

An Abstract for the 2003 AIAA/JPC

By

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A team including Sierra Engineering, AFRL, and TRW tested several different hydrocarbon fuels in a 1200 pound thrust hydrogen peroxide/ hydrocarbon rocket uni-element combustor at the AFRL propulsion directorate Edwards AFB research site. Tests were conducted with a variety of hydrocarbon fuels, including JP-8, RP-1, JP-10, toluene, quadricyclane, and turpentine as well as a several mixtures of these listed fuels. The combustor used decomposed hydrogen peroxide at concentrations of 90% as the oxidizer. The water-cooled combustion chamber included significant fuel film cooling with an overall mixture ratio between 4 and 6. All testing was conducted at a chamber pressure of approximately 780 psia.

Figures of merit to be presented in this paper include characteristic velocity and energy release efficiencies. The experimental performance results were compared with computations performed by PERCOPP, a program for predicting mixture ratio striations within the engine, and TDK. Agreement was generally excellent, C\* and ERE agreeing to within 1%.

During the course of testing, several chemicals normally not used as a rocket propellant were tested. This paper will also cover some of the operational issues regarding the use of these propellants in rocket propulsion testing.

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